

Work Order ID 72998

Tuesday, August 23, 2011 10:08:12 AM

DWG
U/R



Page 1

Item ID: D350-748-101

Accept



Setup Start



Revision ID:

Stop



Item Name: Crosstube Installation, High Fwd

Start Date: 8/23/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 8/31/2011 Req'd Qty: 1.00

Customer:

Reference:

Run Start



Approvals: Process Plan:

Date: 11-08-28 Tooling:

Date:

Stop



QC:

Date: SPC (Y/N):

Date:

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

Draw Nbr

Revision Nbr

D350-748-141

F

100

0.00



DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile & type labels per PPPD350-748-101 CHG002.

11-10-12
HGS MLJ 11-10-12

110

0.00



BENDING MACHINE - CROSSTUBES

CNC Bend-I

Memo

0.00

CNC Delta 100 Bender

Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT

DP 11-9-28

120

0.00



QC15- Crosstube Dimensional Check

QC

Memo

0.00

Quality Control

UP 11-9-28

196-613

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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Approvals:

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Date:

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

125

0.00

SAD

①

11-09-27

HandFXtube

Memo

0.00

Hand Finishing Crosstubes

Stress relief

Heat treat crosstube as per QSI010 4.3

Temp: 375

Start time: 7h00

Finish time: 11h00

127

QC6- Inspect dimensions to drawing

0.00

Sub 127

QC

Memo

0.00

Quality Control

Dart Aerospace Ltd

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Run Start



Approvals:

Process Plan:

Date:

Tooling:

Date:

Stop



QC:

Date:

SPC (Y/N):

Date:

Sequence ID /
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

130

0.00



Crosstubes

Crosstubes

Memo

0.00

1-Drill Tube as per Dwg D350-748-141 Using DT8876 A,B & C Drill Jigs,
Set-up drill table as per QSI 010

2-Deburr

3-Engrave Part # and Batch # as per Dwg D350-748-141

4-Remove all marks from tube within limits of D350-748-141

5- Apply a light coat of LPS3 on the interior of tube

Batch: M109956

DL
SAD

11-09-30

SAD
JW

11-09-30

140

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

CHECK 10 DEG HOLES WITH DT8876E (EUROCOPTER CLAMP)

8/21/9/30

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Process Plan:

Date:

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

150

Outsource process-Cadplate per QSI017 4.1.9.1

0.00



Outsource3

Memo

0.00

Outsource process - Cad plate

Issue P/O: 15070
Stress relief at 375° for 5 hours
Magnetic Particle Inspect per ASTM E1444
Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2
Embrittle relief at 375° for 8 hours, Chromate Treat
Possible Supplier: Southwest United Industries
Ensure Certificate of Conformity is attached

11-09-30

160

Receive & Inspect for Damage & Mat'l Certs

0.00



Packaging

Memo

0.00

Packaging

Ensure certificate of conformity is attached

11-10-09

170

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

Quality Control

★ SEE W/O CHG ATTACHED

POSITIVE RECALL

EFFECTIVE 11.09.29 AUTH CP

RELEASED CP DATE 11.10.11

GET ENG DISPOSITION
ON THIS







Dart Aerospace Ltd

W/O: 12998		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D350-748-101 PAR #: N/A Fault Category: X-tube NCR: Yes ☒ No ☐ DQA: A Date: 11.10.18
11-901 Resolution: use-as-is Disposition: use-as-is QA: N/C Closed: ck Date: 11/10/18

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
11.10.11	146/170	Twist > 0.500"	CP 11.10.11 PS/042	Re-measured tube after CAD-plating. Twist - 0.090" NEW FAI ATTACHED ACCEPTABLE	CP 11.10.11 PS/042	S 11/10/12	CP 11.10.11 PS/042	S 11/10/12
11.10.11	160	Alodine color scrapped scraped off in several areas	CP 11.10.11 PS/042	CAD Plating scuffed in several areas. Acceptable, metal not scratched.	CP 11.10.11	S 11/10/12	CP 11.10.11 PS/042	S 11/10/12

NOTE: Date & initial all entries

W/O: 72938		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	
11.10.07	161	LOAD TUBE to 3500 ¹² FOR 1 MINUTE PER D.S. REMOIL		11.10.07	1	 11.10.07 Q51042	 wholier	
11.10.07	162	NDT tube PO 15121		11-10-11	1	 11.10.07 Q51042	 11/10/12	

Part No: D350-748-101 PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries

Chris Provencal

From: David Shepherd <dshepherd@dartaero.com>
Sent: Tuesday, April 27, 2010 3:40 PM
To: 'Mike Petsche'
Cc: 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com
Subject: 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

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Approvals: Process Plan: Date: Tooling: Date:

Stop



QC: Date: SPC (Y/N): Date:

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

180

0.00



SprayPaint

SprayPaint

Memo

0.00

Spray Painting

1-Prime inside crosstube as per QSI 005 4.2
2-Prime Outside of Tube as per Dart QSI 005 4.2

11 10 11 ①

190

QC14- Inspect Spray Paint

0.00



QC

Memo

0.00

Quality Control

Then, Wrap in plastic bag to protect from scratches

11 10 12 ①

200

0.00



Crosstubes

Crosstubes

Memo

0.00

Crosstubes

1-Install Ground wire Insert, then insert screw and washer
2-Install Abraison strips as per Dwg D350-748-141 & QSI 035.
3-Install supports Using Dt8876 as per Dwg D350-748-141, Torque to 60-80 IN-LBS

11/10/12 ①

Dart Aerospace Ltd

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Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop

Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

210

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

Quality Control

220

Pick Kit

0.00



Packaging

Memo

0.00

Packaging

230

QC4- 100% Inspect kits for completeness

0.00



QC

Memo

0.00

Quality Control

11 10 12 (17)

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Run Start



Approvals: Process Plan: Date: Tooling: Date:

Stop



QC: Date: SPC (Y/N): Date:

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240	Packaging	0.00							
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPP D350-748-101								
	Location: _____								
	PPP Rev: _____								
250	QC21- Final Inspection - Work Order Release	0.00							
QC	Memo	0.00							
Quality Control									

11/10/12

mf

11-10-12

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries

Picklist Print

Tuesday, August 23, 2011 10:08:18 AM

Page 1

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Parent Item Name: Crosstube Installation, High Fwd



Start Date: 8/23/2011

Required Date: 8/31/2011

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 06-07-05 JLM
 IPP Rev:B Update qty of MS21042L5 06-09-12 KJ
 IPP Rev:C Rev B 07-11-15 DD
 IPP Rev D Combined manufacturing 08.04.02 EC verified by: DD
 IPP Rev:E 08-06-24 revD as per dwg DD verified by:EC IPP Rev:F
 10.08.04 added QSI010 4.3 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D350-748-141TRN 		Manufactured	No			110	Each	0.0000	1	1			
Crosstube Turning Detail													
ALS4-1032-225 		Purchased	No			200	Each	931.0000	1	1			
Insert													

B72334

SAD

11-07-27

11/10/12

B# 118696

Location

Loc Qty

Loc Code

ST282
 110768
 117717
 118386

931
 62
 9
 860

AN960JD10 NAS1149D0363J Purchased No



Washer

D2856-400



Abraison Strip

B# 118077

Manufactured No

200 Each 0.0000 1

200 f 266.7845 1.181 1.243158

11/10/12

11/10/12

Location

Loc Qty

Loc Code

ST403
 68076
 ST409
 63735
 71164

50.1149
 50.1149
 216.6696
 0.6696
 216

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Start Date: 8/23/2011

Required Date: 8/31/2011

Start Qty: 1.00

Required Qty: 1.00

D3502-1 Manufactured No

200 Each

25.0000

2 2



Support



mt 11/10/12

Location

Loc Qty

Loc Code

ST063

25

61206

12

61843

3

64004

10

MS21920-20

Purchased No

200 Each

102.0000

2 2



Clamp (per MIL-DTL-8783C)

mt 11/10/12

Location

Loc Qty

Loc Code

LG050

102

116799

10

118236

42

118649

50

MS27039-1-10

Purchased No

200 Each

299.0000

1 1



Screw

mt 11/10/12

Location

Loc Qty

Loc Code

ST290

99

117441

99

ST291

200

118612

200

Dart Aerospace Ltd

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Start Date: 8/23/2011

Required Date: 8/31/2011

Start Qty: 1.00

Required Qty: 1.00

AN4-41A

Purchased

No

220

Each

299.0000

8

Bolt

Location

Loc Qty

Loc Code

ST360

299

115108

74

115705

50

116191

50

117619

50

117795

25

118451

50

AN4-6A

Purchased

No

220

Each

1,184.000

16

Bolt

Location

Loc Qty

Loc Code

ST356

984

116924

84

117872

200

118422

300

118628

400

ST358

200

117514

200

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Shop Packet Print

Page 3

Dart Aerospace Ltd

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Start Date: 8/23/2011

Required Date: 8/31/2011

Start Qty: 1.00

Required Qty: 1.00

AN5-32A

Purchased

No

220

Each

222.0000

4

4



Bolt

Location

Loc Qty

Loc Code

ST339

50

118628

50

ST340

172

117161

1

117514

11

117872

60

118191

50

118422

50

AN960JD416

NAS1149D0463J

Purchased

No

220

Each

0.0000

32

32



Washer

AN960JD516

NAS1149D0563J

Purchased

No

220

Each

0.0000

8

8



Washer

D3500-1

Manufactured

No

220

Each

32.0000

4

4



Saddle

Location

Loc Qty

Loc Code

ST424

9

66127

9

ST424/25

20

62207

20

ST425

3

61838

3

Dart Aerospace Ltd

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Start Date: 8/23/2011

Required Date: 8/31/2011

Start Qty: 1.00

Required Qty: 1.00

D3501-1

Manufactured No

220

Each

321.0000

16

16



Bushing

Location

Loc Qty

Loc Code

ST063

221

61984

19

68939

102

70682

100

ST066

100

67757

100

MS21042L4

Purchased

No

220

Each

4,639.000

24

24



Nut

Location

Loc Qty

Loc Code

ST300

4639

117441

494

117601

645

117885

1500

118451

2000

MS21042L5

Purchased

No

220

Each

1,185.000

4

4



Nut

Location

Loc Qty

Loc Code

ST300

1185

116405

5

116548

53

117441

498

117591

43

117611

90

118179

496

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
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Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

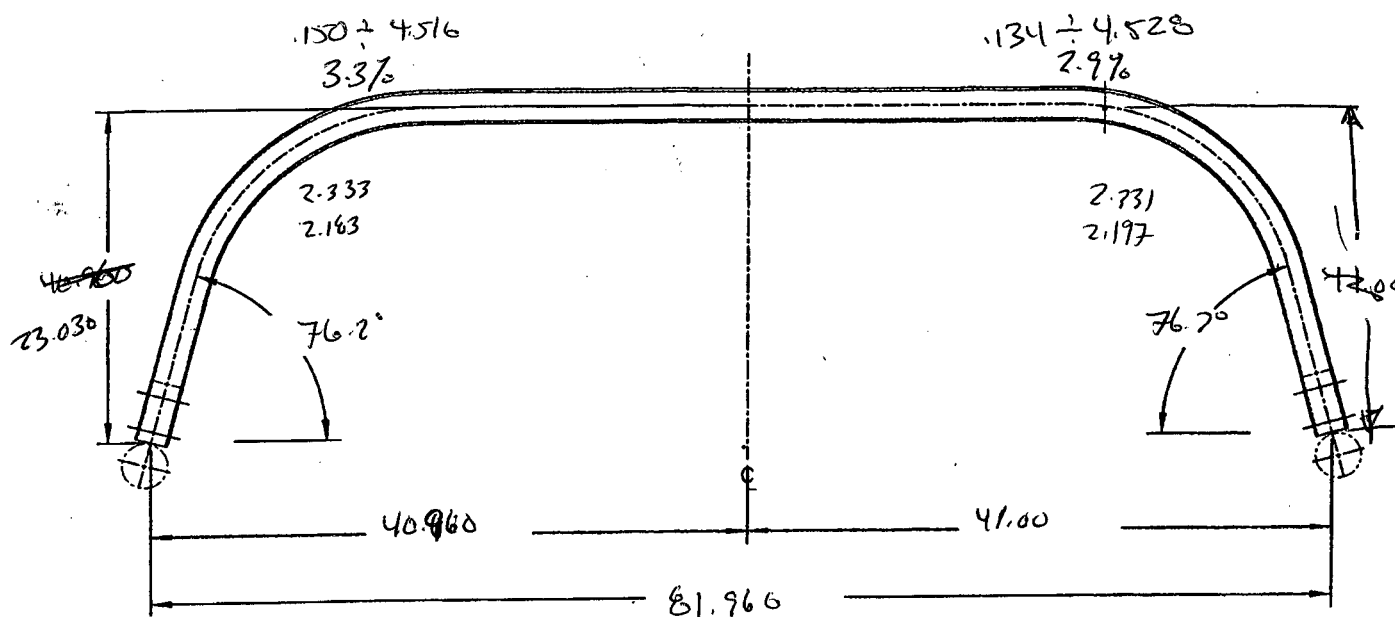
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	72998
Description: Crosstube High Fwd (AS350/355)	Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: E		Page 1 of 1

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



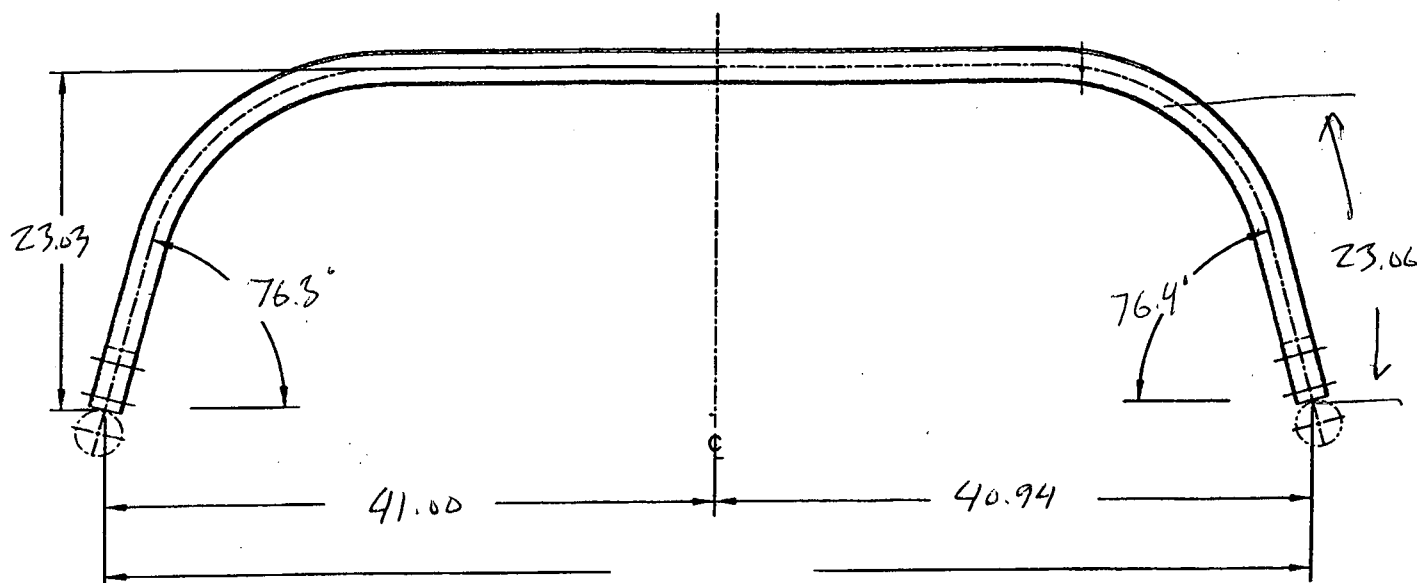
Comments			
twist	0.558		
Side A =	3.3%	crush	@ 30 Pass
Side B =	2.9%	crush	@ 30 Pass

QC15 Inspection	<i>AP</i>
Date	11/08/12

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	<i>[Signature]</i>

DART AEROSPACE LTD		Work Order:	72998
Description: Crosstube High Fwd (AS350/355)		Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



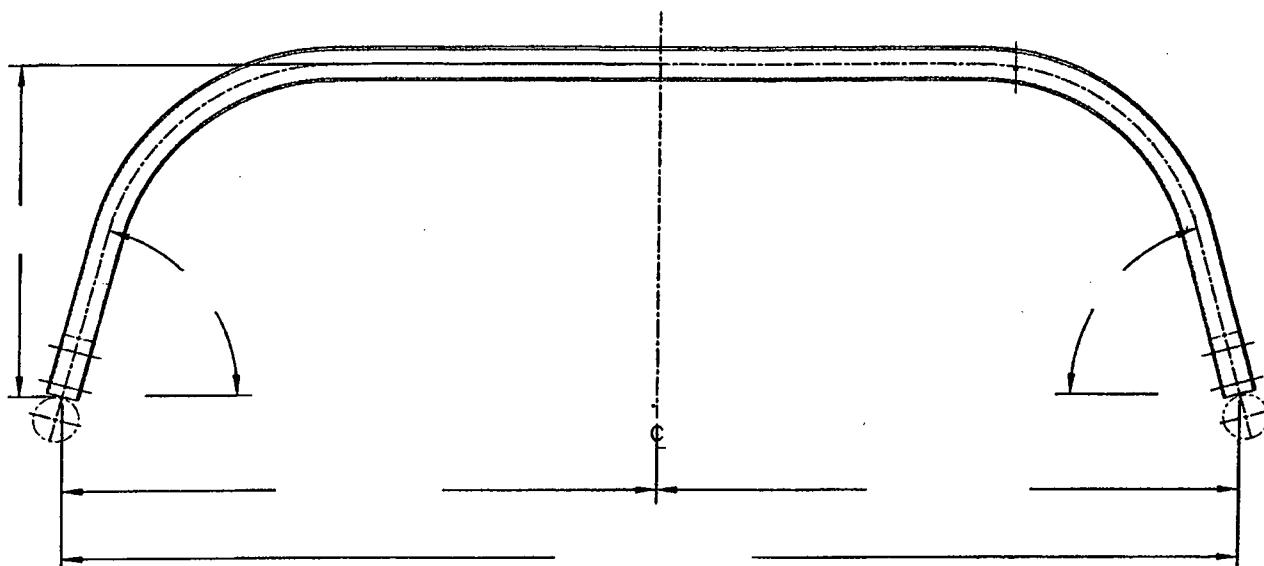
Comments
Twist = 0.090

QC15 Inspection	<i>CP</i>
Date	16.10.11

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	<i>[Signature]</i>

DART AEROSPACE LTD		Work Order: 72998
Description: Crosstube High Fwd (AS350/355)		Part Number: D350-748-101
Inspection Dwg: D350-748-141 Rev: E		Page 1 of 1

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments
twist > 0.567

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

11/08/23



Item	Qty -141	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115
FINISHED LENGTH = 110.270±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER 'D350-748-141' AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 72928

11-08-23

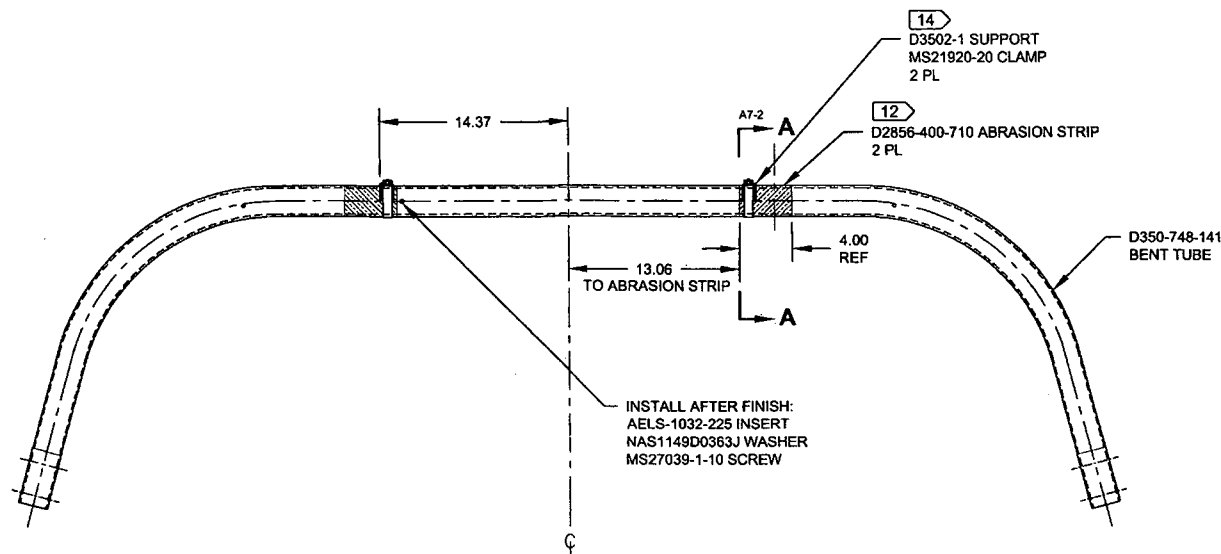
UNDER REVIEW

11.07.12

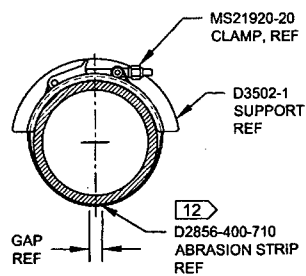
RELEASED
2011-01-18

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	10.11.23		

DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D350-748-141	REV. F SHEET 1 OF 4
TITLE CROSSTUBE (AS 350/355 HI FWD)	SCALE NTS
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**D350-748-141
ASSEMBLY DETAIL**









SECTION A-A D4-2
SCALE 4X

UNDER REVIEW

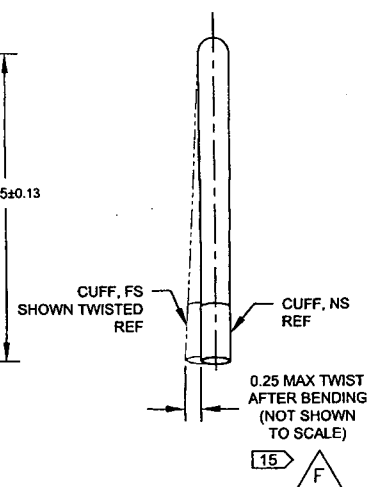
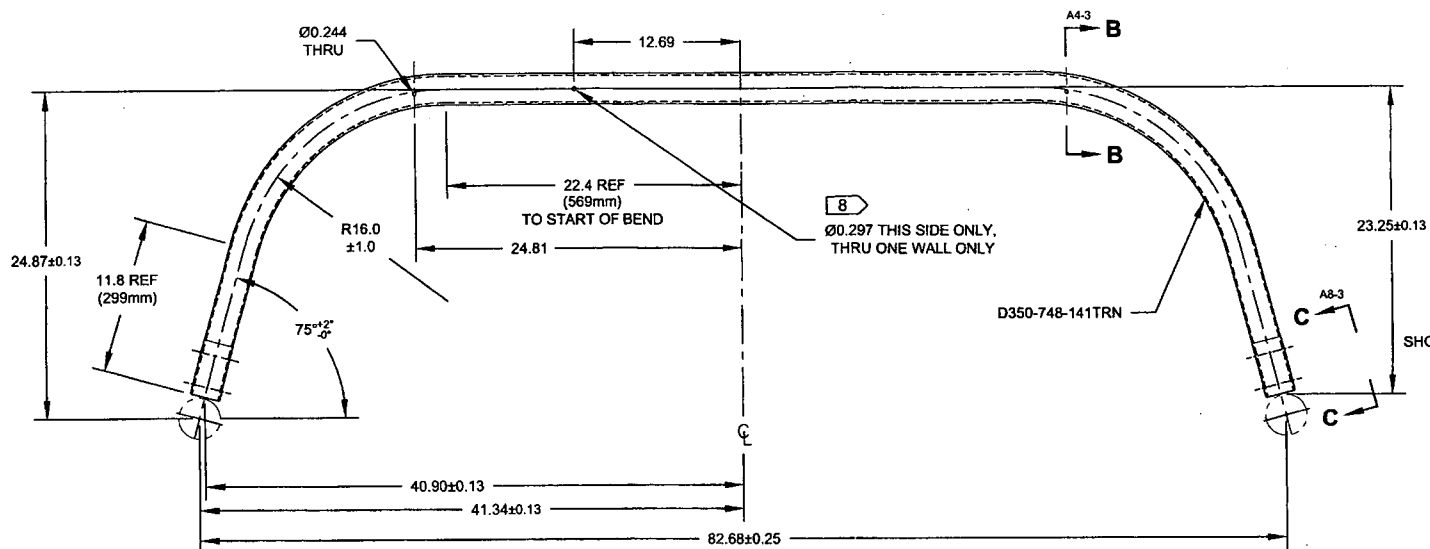
11.07.11

RELEASED

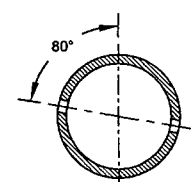
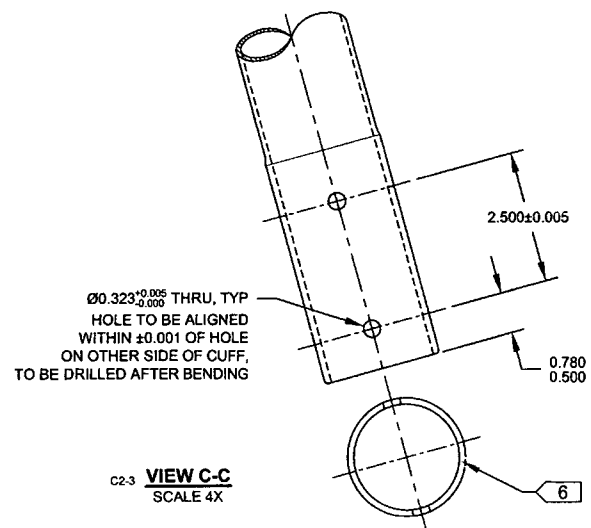
2011-01-18

DESIGN		DART AEROSPACE LTD	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 2 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	COPYRIGHT © 2008 BY DART AEROSPACE LTD	
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8 7 6 5 4 3 2 1



D350-748-141
BENDING AND DRILLING DETAIL 10



SECTION B-B D3-3
SCALE 4X

72998

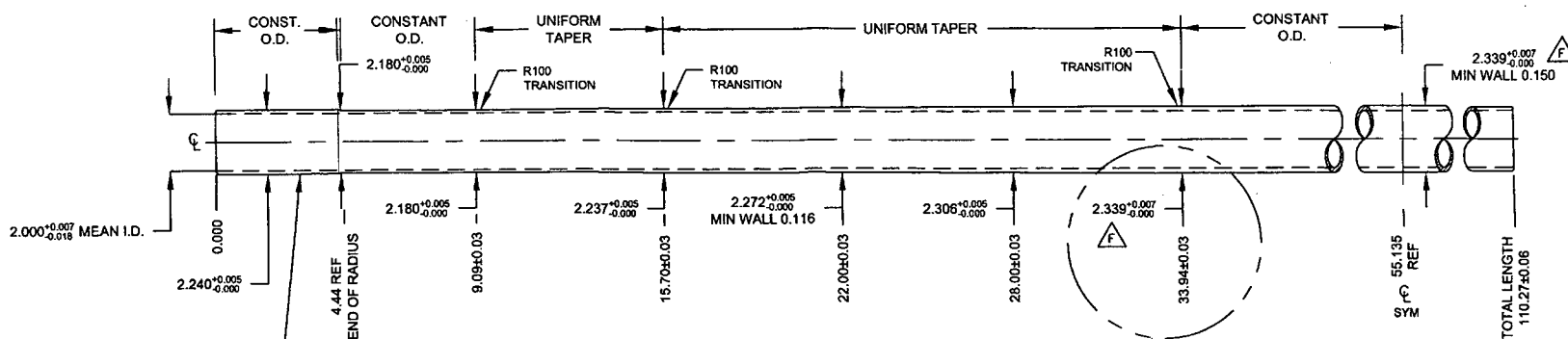
UNDER REVIEW
11.27.12

RELEASED
2011-01-18

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DRAWN	9	HAWKESBURY, ONTARIO, CANADA	
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MFG. APPR.	13	D350-748-141	SHEET 3 OF 4
APPROVED	13	TITLE	SCALE
DE APPR.	13	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1



SEE DETAIL D
A8-4

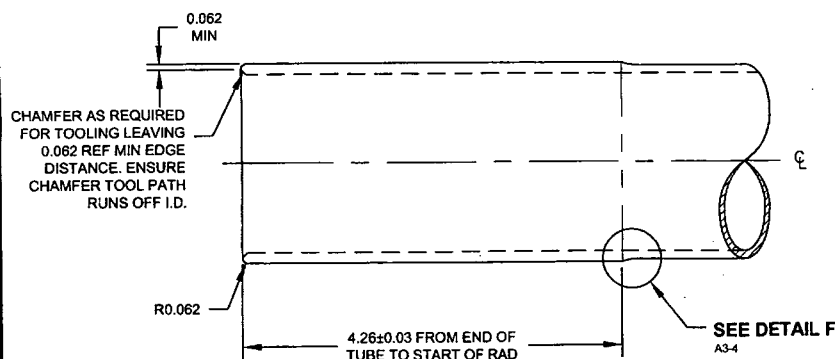
SEE DETAIL E
A1-4

UNDER REVIEW

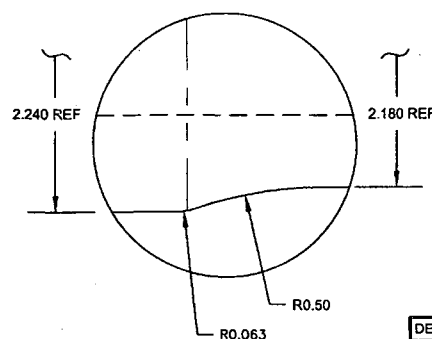
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**D350-748-141TRN
TURNING DETAIL**

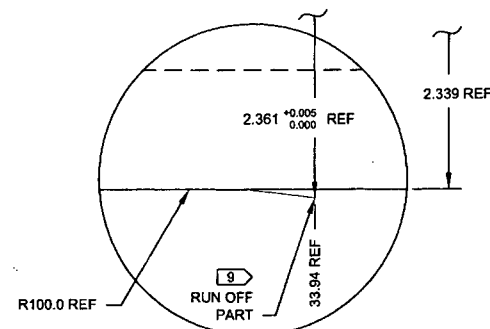
22998



**DETAIL D:
CROSSTUBE CUFF** C7-4
SCALE 3X



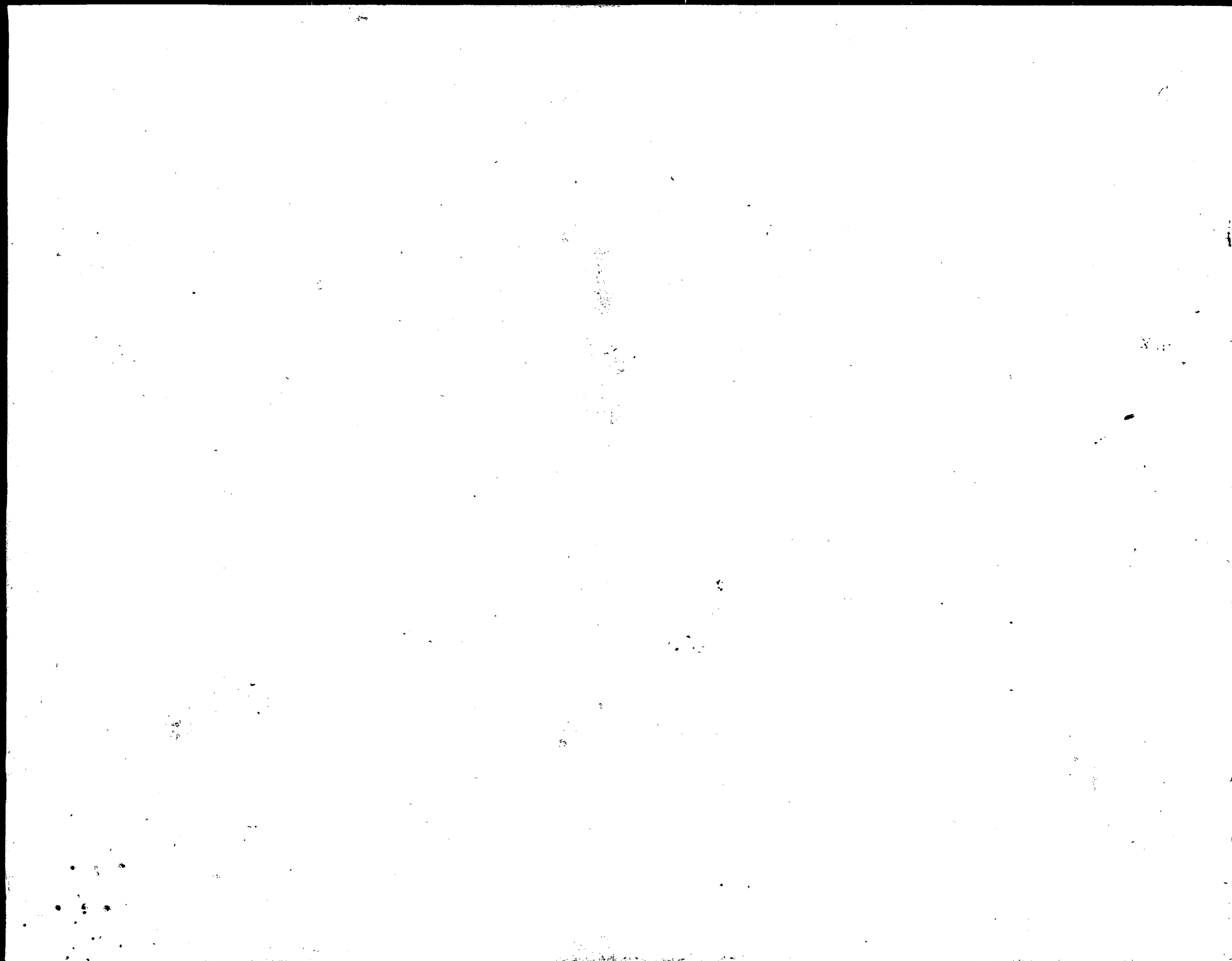
**DETAIL F:
CUFF TRANSITION** A5-4
NOT TO SCALE



RELEASED
2011-01-18

**DETAIL E:
TAPER RUN-OFF** C3-4
NOT TO SCALE

DESIGN		DART AEROSPACE LTD	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 4 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
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**CERTIFICATE OF
CONFORMANCE**

**CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1**

DATE: Oct-05-2011

CONSIGNED TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 108219

INVOICE #: 57013

**CONTRACT OR
PURCHASE ORDER #**

PO15070

DESCRIPTION: SKID

QTY 1

P/N # d350-748-101

S/N # B72998

STRESS RELIEF BAKE @ 375 DEG. FOR 5 HRS. MPI IAW ASTM-E-1444. CADMIUM PLATED IAW AMS-QQ-P-416C, TYPE 2 YELLOW, CLASS 1. HYDROGEN EMBRITTLEMENT BAKE @ 375 DEG. FOR 8 HRS. BAKE HEAT CHARTS #11-1036 & #11-1040.

8 u110107

CERTIFICATE: I certify that the items indicated here on have been inspected and tested and conform to all specifications and requirements detailed on the contract or purchase order.

Approved Inspector:



[Handwritten signature]



1. 003427

Client : DART AEROSPACE
 Contact : LINDA
 Lieu de travail : 1270 ABERDEEN ST, HAWKSBURY, ONT. K6A1K7
 Description : FPE ON X-TUBES
 # Rapport : P-12076

Travail : _____
 Jour : Dim Lun Mar Mer Jeu Ven Sam
 # P.O. : 30 551
 # Véhicule : _____

Date : 2016-07
 W.O. # : 188-11-02 370
 Caméra # _____

[illegible]

Consumables : _____

Équipement : _____

Représentant Client : X

Eric Downing 11/19/07

Cochez la case appropriée à la liste de sécurité-radiation

V/C	VÉRIFICATION CAMÉRA
-----	---------------------

V/E VÉRIFICATION ÉQUIPEMENT SÉCURITÉ

V/D VÉRIFICATION AVEC DÉTECTEUR DE RADIATION

B/I	BARRIÈRE & PANNEAUX INSTALLÉS
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C/N CAMÉRA VERROUILLÉE & ENTREPOSÉE SÉCURITAIREMENT

C/S CAMÉRA SONDÉE APRÈS CHAQUE UTILISATION

NOTES: WAITING TIME (3^{1/2} HOURS)

pieces was not received

Jonquière (418) 542-8273 • Téléc.: (418) 542-5494

Saint John (506) 847-0194 • Téléc.: (506) 847-0194

Val-d'Or (819) 354-9030 • Téléc.: (819) 825-9564

Oakville (905) 825-8595 • Téléc.: (905) 825-8598

Gaspé (418) 392-3618 • Téléc.: (418) 392-4114

Sudbury (705) 522-1849 • Téléc.: (705) 522-9926

Montréal (514) 207-9226

Cambridge (519) 622-3112 • Téléc.: (519) 622-1326

Ottawa-Ontario (819) 360-0685 • Téléc.: (819) 827-3513

Cornwall (613) 931-1261 • Téléc.: (613) 931-2777

Sherbrooke (819) 620-5456 • Téléc.: (819) 346-6828

Sarnia (519) 336-3021 • Téléc.: (519) 336-8220

Halifax (902) 497-3870 • Téléc.: (902) 445-5090

Thunder Bay (807) 475-4240 • Téléc.: (807) 577-2017

ACUREN



P. 12176

PAGE 1 DE 1
HEURE ☐ AM ☒ PM

CLIENT	DART AEROSPACE	DATE	2011-10-07	HEURE	<input type="checkbox"/> AM <input checked="" type="checkbox"/> PM
ATTENTION	LINDA	N° TRAVAIL	188-11-02370		
ADRESSE	1270 ABERDEEN ST HAWKESBURY, ont. K6A 1K7	N° CLIENT PO/WO	30551		
PROJET	30551	SITE DE TRAVAIL	SHOP		
ITEM(S) EXAMINÉ	CROSS TUBE D 350-748-101, 72997 ID 66923; 72999; 72997; 72998	ACCEPTATION STD.	ASTM E1417-09	DATE/RÉV.	09
			(NO CRACK)		

DESCRIPTION DES TRAVAUX	N° PROCÉDURE	LT- ACT ^{PT} 01	DATE/REV.	2-11/0	N° TECHNIQUE	LT-XX ³ -XXX	DATE/REV.
N° ITEMS	MATÉRIEL		ÉPAISSEUR				
DESCRIPTION	FPI ON 4 X-TUBES 100% OF EXTERNAL SURFACE						

MÉTHODE :	<input checked="" type="checkbox"/> FLUORESCENT	<input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> LAVABLE À L'EAU	<input type="checkbox"/> MÉTHODE DISSOLVANT	<input type="checkbox"/> PRÉ-ÉMULSIONNANT		
MARQUE :	MAGNAFLUX	BATCH: 10C072	LUM. NOIRE S/N 26529	<input checked="" type="checkbox"/> PUISS. > 1 000 μ W/CM ²	<input checked="" type="checkbox"/> AMBIANT < 2 $^{\circ}$ C		
PÉNÉTRANT :	Zygo 2167	TEMPS PÉNÉTRATION MIN. 10	MIN.	ÉQUIP. LUMIÈRE	<input checked="" type="checkbox"/> LAMP. POCHÉ	<input type="checkbox"/> LAMP. CULASSE	<input checked="" type="checkbox"/> PUISS. > 100 $^{\circ}$ C @ SURFACE
DISSOLVANT PÉNÉTRANT	TEMPS SÉCHAGE MIN. >10	MIN.	AUTRES				
RÉVÉLATEUR	TEMPS RÉVÉLATION MIN. 10	MIN.	MÈTRE LUM. N/S	DATE CAL DUE			
TYPE RÉVÉLATEUR	<input type="checkbox"/> NON AQUEUX	<input type="checkbox"/> AQUEUX	<input type="checkbox"/> SEC				

CONDITION SURFACE	<input type="checkbox"/> MEULÉE	<input type="checkbox"/> SOUDÉE	<input checked="" type="checkbox"/> MACHINÉE	<input type="checkbox"/> MRENAILLÉE	<input checked="" type="checkbox"/> MÉTAL PROPRE
TEMPÉRATURE SURFACE	<input type="checkbox"/> < - 4°C/20°F	<input checked="" type="checkbox"/> - 4°C/20°F A 10° C/50°F	<input type="checkbox"/> 10°C/50°F A 52°C/125°F	<input type="checkbox"/> > 52°C/125°F	

ITEM	COMMENTAIRES	ACCEPTÉ	REJETÉ
1	ID 72 998	✓	
2	ID 72 999		✓
3	ID 72 997		✓
4	ID 66 923	✓	

(CRACKS TRANSVERSE TO THE TUBE ON 2 SIDES)
(CRACKS TRANSVERSE TO THE TUBE ON 1 SIDE)

L'entente selon laquelle le Groupe Acuren Inc. exécute les services ne concerne que les énoncés par écrit. En aucune circonstance ces services ne s'étendent au-delà de l'exécution des services demandés. Il est entendu que toutes les descriptions, les observations et les expressions d'opinions faites par Acuren reflètent les opinions ou les observations de l'entreprise fondées sur l'information et les hypothèses fournies par le propriétaire/opérateur, et elles ne constituent pas des déclarations ou des garanties ou ne peuvent être interprétées comme constituant. Le Groupe Acuren Inc. n'assume aucune des responsabilités du propriétaire/opérateur, et le propriétaire/opérateur conserve la responsabilité entière des décisions prises en matière d'ingénierie, de fabrication, de réparation et d'usage à partir de l'information ou des données fournies par Acuren en rapport avec les services décrits dans les présentes ne peuvent excéder le coût des services rendus.

Dans l'exécution des services, le Groupe Acuren Inc. Applique le degré de diligence, le soin et la compétence normalement exercés dans des circonstances semblables par d'autres fournisseurs de ce type de services opérant dans la même localité ou dans une localité similaire. Aucune autre garantie, implicite ou explicite, n'est faite ou voulue par le Groupe Acuren Inc.

REPRÉSENTANT	<u>Eric Duguay</u>		FTJ#:
TECHNICIEN (SIGNATURE):	<u>[Signature]</u> MOULÉ	<u>[Signature]</u> SIGNATURE	
NOM (MOULÉ):	<u>David Pepin</u> 1 ^{er} TECHNICIEN	<u></u> 2 ^{ème} TECHNICIEN	RAPPORT RÉVISÉ PAR:
	ONGC NIVEAU <u>2</u> SNT NIVEAU <u>2</u>	ONGC NIVEAU _____ SNT NIVEAU _____	NOM
	ONGC N° REGISTRATION <u>11611</u>	ONGC N° REGISTRATION _____	INITIALES